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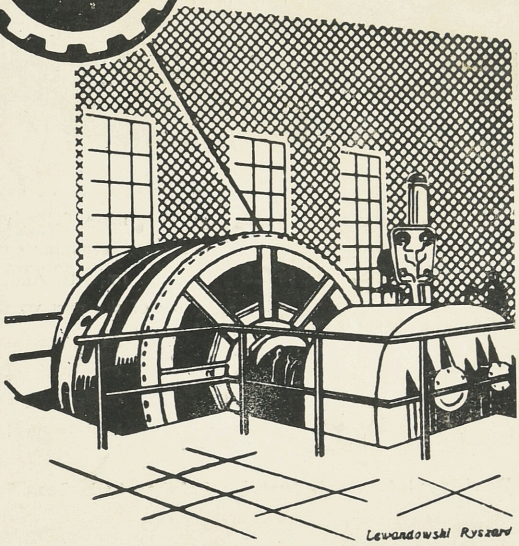

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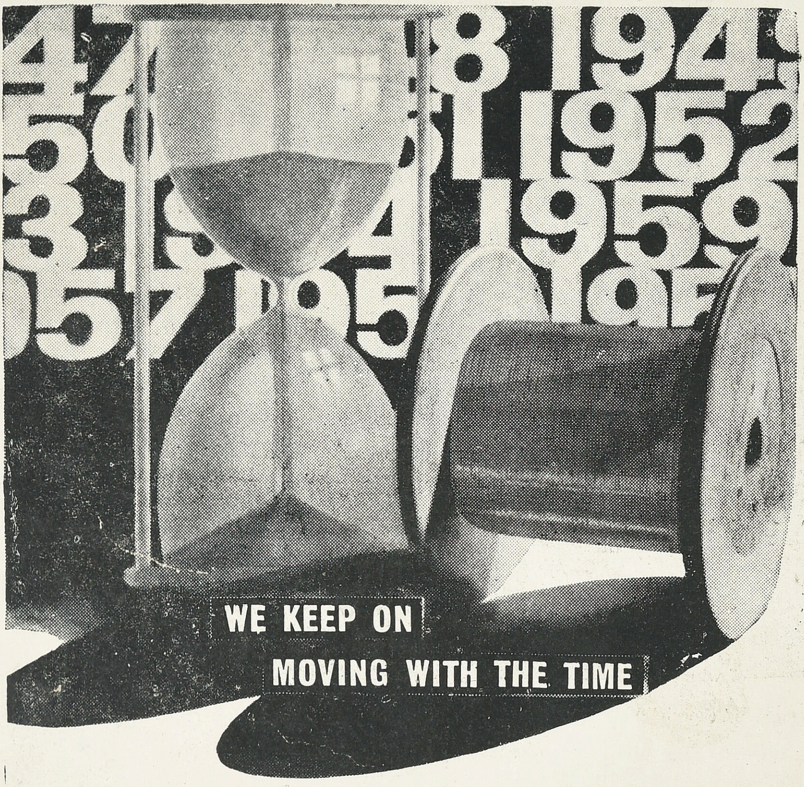

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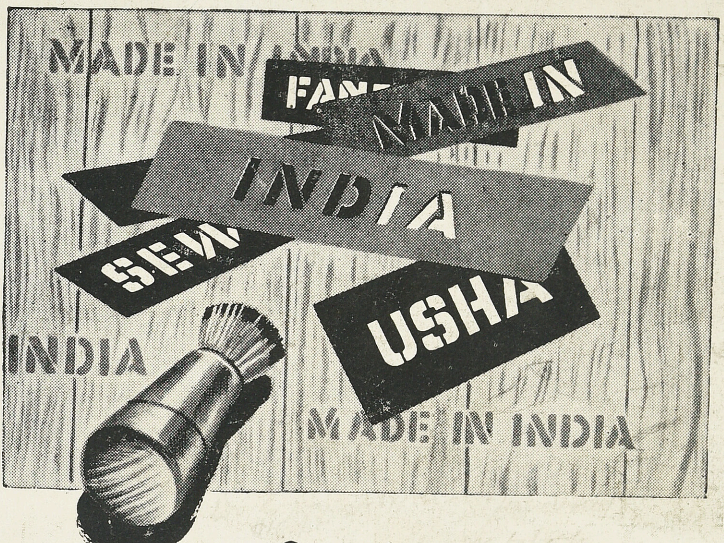

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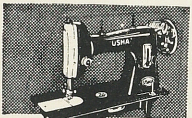

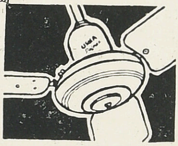

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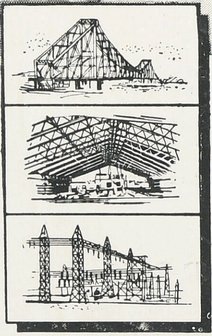

COATING steel with Composite Aluminium Primer and finishing Aluminium Paint is the modern trend in painting steel structures. No wonder therefore that the steel plant at Rourkela is using thousands of gallons of aluminium paint for various steel structures and is also trying out Composite Aluminium Primer in certain sections.

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ENGINEERING NUMBER

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ENGINEERING INDUSTRIES

Machine Tools, cables, foundry work, heavy electrical equipment and manufacture of heavy machinery have progressed well, in spite of the shortage of raw materials and foreign exchange difficulties. The production trend is generally upwards. In some, the increase in output is really remarkable.

Heavy Electricals

A factory for the manufacture of heavy electrical equipment such as turbines, transformers, control gear, switch gear, traction equipment, etc. is being set up at Bhopal known as 'Heavy Electricals', with an authorised capital of Rs. 30 crores. It has been decided to implement the project in three phases. The first phase consists of manufacture of transformers, capacitors, control gear and switch gear. The capital outlay on this phase will be Rs. 28 crores, including Rs. 7 crores on the township. The output of the factory during the first phase has been estimated at Rs. 6 crores per annum, with an employment potential of nearly 5,000 people. The factory is scheduled to go into production in the latter part of 1960. When all the phases are completed, the value of the output is expected to be Rs. 25 crores per annum.

Heavy Machinery

'Heavy Engineering Corporation Ltd.,' has been constituted in December 1958, for the administration of heavy engineering projects, viz. heavy machine building. manufacture of coal mining machinery, foundry forge projects and other schemes likely to be taken up in future in the same or similar fields. The authorised capital of the company is Rs. 50 crores. The company is situated at Ranchi.

A Heavy Machine Building Plant will be set up at Hatia, a few miles south of Ranchi. The plant will have a production capacity of 45,000 tons of finished machinery items per annum. It is intended to produce machinery and equipment for iron and steel, mining, oil, coal and cement industries, as well as for the execution of other orders for heavy equipment such as coke oven and by-product equipment, excavators, cranes, heavy oil drilling rigs, equipment for crushing and grinding, mining and press forging and also miscellaneous heavy-machine parts and assemblies and other ancillary items. The machine building plant is being established with Soviet assistance.

A coal mining machinery plant will be set up in Durgapur in West Bengal for the manufacture of coal mining machinery, in collaboration with Technoexport, Moscow. This plant will be capable of manufacturing 30,000 tons of coal mining machinery and spare parts per annum.

The Government have decided to establish at Ranchi, in close proximity of the heavy machine building plant, a foundry forge plant, in technical collaboration with the Techno-export of Czechoslovakia. This plant will serve as a metallurgical base to the heavy machine building plant. It is expected to go into production by the middle of 1962. The capacity of the plant will be 69,000 tons of different types of castings and forgings in its first stage and 131,000 tons in its second stage ; the latter will correspond to the first stage of the heavy machine building plant.

The Government have recommended the revision of the target for the steel structurals industry (excluding railway wagons) from 2,50,000 tons per annum, as originally laid down for the Second Five-Year Plan, to 4,50,000 tons per annum. In all, twenty-one industrial firms have been licensed.

Ball bearings, Bicycles, Sewing Machines, Zip Fasteners, Hosiery Needles, Clocks, Duplicators, Crown Corks, Rubber Ply Belting, Machine Screws and Pressure Stoves have increased their production.

There has been a marked rise in the production of Jute Mill Machinery and Sugar Mill Machinery. At present there are only two units producing printing machinery.

Tea Machinery, Boilers and machinery for chemical and pharmaceutical preparations have increased in production. The scheme for production of Tea Dryer, CTC Machines and spare parts are progressing satisfactorily.

For Mining Machinery, there are only two firms engaged in the manufacture of Haulages and they have made satisfactory progress. The manufacture of coal-cutting machines in collaboration with a West German firm and of Dairy Machinery by a firm in collaboration with their Danish Principals are to be started shortly. The production of weighing machines has registered an increase.

Stone crushers, concrete mixers, tar boilers, asphalt mixers, etc. are expected to be worth Rs. 45 lakhs as against a production of Rs. 29.9 lakhs in 1957. For the first time in India, single and double Bucket Swing type weightbatchers and concrete vibrators have been manufactured in India. Manufacture of Butane Gas Cylinders, and of high pressure cylinders such as Oxygen, Chlorine, Acetylene Cylinders in collaboration with an Italian firm is being considered.

Machine Tools

In 1957 there were only eighteen units manufacturing machine tools. The value of production has gone up to Rs. 3.7 crores during 1958 as against Rs. 2.8 crores during 1957. Hindustan Machine Tools having geared fully for the production of machine tools per month resulted in bringing down the prices of lathes.

They have entered into collaboration with a German firm for the manufacture of 10 different types of Radical Drilling Machines.

Electrical Engineering

The production of electric fans, electric motors, power and distribution transformers, storage batteries, electric house service meters, domestic refrigerators, electric sheet steel, radio-receivers, cables and wires, winding wires, rubber and plastic cables, aluminium conductors, gramophones, water-meters, mathematical instruments, and air-conditioners have increased.

The target fixed for electric fans i.e. 6,00,000 has already been exceeded. Target of 9,00,000 for 1960—61 has been accepted.

Production of paper insulated power cables, Mercury vapour lamps and PVR insulated aluminium cables for house-wiring has been started. ★

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INDO-BRITISH CO-OPERATION AT DURGAPUR

ROB MANSFIELD

Since 1947, when India attained full status as an independent member of the Commonwealth, Indo-British co-operation has scaled new heights. The value of United Kingdom capital invested in India today is approximately £320,000,000—double what it was 10 years ago, and 80.2 per cent. of all foreign capital in India. Indo-British co-operation is not only expanding in volume, but spreading to new forms.

An outstanding example of these new forms is the new £100,000,000 steel works which the Indian Steelworks Construction Co. (ISCON), a consortium of leading British mechanical, structural, civil, and electrical engineering companies, is building for the Government of India at Durgapur, West Bengal.

It was an important day for India when, with the recent opening of No. 1 coke-oven battery, the Durgapur project first stirred into productive life. The coke produced will be used for no. 1 blast furnace, due to produce pig iron by the end of the year.

Most Experienced

It is interesting to note that—like several other members of the ISCON consortium—Simon-Carves, who have built Durgapur's three coke-oven batteries, are completely at home in India, for they have been building coke ovens here for more than half-a-century and have greater experience of Indian coke-oven construction than any other company in the world. Their first coke ovens in India were built in 1908 for the East Indian Railway. Since the early 1920's, they have carried out a long series of coke-oven contracts for the Indian Iron & Steels Co., and since the 1930's have built most of the coke ovens for the vast Tata Iron & Steel Co.

When India's great expansion programme for the iron and steel industry is completed in both public and private sectors (including the Soviet-built works at Bhilai and the German works at Rourkela), over 60 per cent. of Indian pig iron will be made with the help of Simon-Carves coke ovens.

The Durgapur works as a whole is scheduled for completion in 1961, but construction has been planned in stages to enable the productive capacity of the various departments to be used to earn money as they become available.

In all, 30,000 men are at work at Durgapur, of whom only some 350 are British. As the number of British technicians and supervisors has been kept to the minimum, a very large number of Indian engineers have gained valuable experience in steelworks construction.

Designed for Expansion

When the works go into full operation they will have a capacity of 1,000,000 ingot tons a year, and the layout has been designed to enable the various departments to be expanded to produce 2,500,000 ingot tons a year. Supervisory staff will total about 650, and other workers 10,000. Under the Technical Co-operation Scheme of the Colombo Plan, Britain is financing the training in the United Kingdom of 350 Indian engineers for the supervisory and operating staff.

With No. 1 blast furnace scheduled to make iron about the end of 1959, the first stage—ironmaking—of the works will have been completed and in operation. In May 1960 additional ironmaking capacity, with the first three steel-melting furnaces, will go into operation and, at this stage, the production of steel billets will also commence. From that point, progressively, the reminder of the works will come into production on a gradual and planned basis, until by mid-1961 the full, integrated plant is in production.

Many Ancillaries

All this covers the main plant, but each section includes a vast number of ancillaries—coal handling, stocking, washing, and by-product plants in the coke-oven area; ore handling, lime, and dolomite plants in the blast-furnaces area; electrical, steam, water, and other services in all areas; and so on.

The basic object of the ovens is to produce coke for the blast furnaces, but many valuable by-products emerge in the process of carbonizing coal—benzine, toluene, tar, sulphate of ammonia, and other items, each of which has its own contribution to make to both industry and agriculture.

To give an idea of the gigantic task undertaken by ISCON in constructing the complete coking plant at Durgapur. I should add that some 200,000 tons of concrete, 15,000 tons of structural steelwork, and over 40,000 tons of refractory brickwork have been used

Indians and British alike will take pride in the completed Durgapur works, because it will be the result of the closest teamwork between, on the one hand, a consortium of United Kingdom firms, 350 British engineers, six United Kingdom banks (which provided a credit of £11,500,000) and the British Government (£15,000,000 loan) and, on the other, the Indian Government (which found the initial finance by drawing £26,000,000 from sterling balances), Hindustan Steel Ltd., and several thousand Indian engineers, contractors, and workers. ★

Nothing is more exhilirating than a pleasing and covetous appearance. The myriad uses of aluminium paint are delightfully sketched here by a renowned expert.

A VERSATILE METALLIC COATING

P. G. V. RAMANAN

Indian Aluminium Co. Ltd., Calcutta

Apart from being bright and attractive in appearance, aluminium paint is superior to all other paints in combining excellent resistance to the weather and to many types of corrosive atmospheres, high reflectivity to light and heat, and good hiding power; and it is unsurpassed in the protection it affords to all kinds of surfaces, and not least, in economy of use. It is a versatile paint suitable for a variety of surfaces; but, for special applications such as priming steel and wood or coating chimneys, special formulations are necessary; and paint manufacturers in India offer such special formulations.

The unique property of aluminium paint is 'leafing'. The pigment is made up, not of fine granular particles randomly dispersed throughout the vehicle, but of minute flat plates of pure aluminium which rise to the surface of the paint film, where they arrange themselves in over-lapping layers. They thus form an opaque metallic coating that presents a barrier to the penetration of moisture and sunlight and also possesses much of the brightness and corrosion-resistant properties of the metal itself. It is to this that aluminimum paint owes the most important of its characteristics which are outlined below.

CHARACTERISTICS

Durability

The chief causes of deterioration in paint films are the penetration of moisture and the effect of light on them. But, whereas in the usual granular paint films moisture takes a direct path through the pigment, in aluminium paints its passage between the overlapping flakes is long and circuitous, with the result that deterioration due to this cause is very much slower. Break-down due to light rays is also minimized, for the layer of metal acts as a shield to the vehicle beneath it.

Again, while most paint films are rapidly discoloured and ravaged by industrial and marine atmospheres, aluminium paint shares to some extent the pure metal's resistance to attack and, therefore, lasts longer in such environments. Unlike lead pigments, for example, it is not discoloured by sulphur-bearing fumes, and it resists acidic atmospheres better than many other paints; it is also successful in mildly alkaline conditions, but less so where severe alkali fumes persist. The widespread use of aluminium paint by the seaside testifies to its effectiveness in withstanding saltladen atmospheres which cause the rapid deterioration of other paints.

Hiding Power

The interleaving of the aluminium pigment to form a continuous metallic layer gives aluminium paint unequalled hiding power. One coat is sufficient to obliterate the underlying surface, whatever its colour. Oil stains, creosote, tar and substances of a type that quickly 'bleed through' other paints can also be successfully covered, though where the stains are particularly soluble in the paint a second coat may be necessary.

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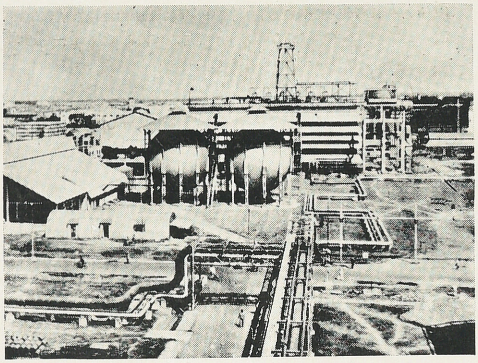


Extensive application of aluminium paint in Sindri Fertilizer Factory

Coverage

Coupled with aluminium paint's remarkable hiding power is its excellent coverage, in which it is generally superior to other paints. As would be expected, coverage varies with the consistency of the paint, the method of application and type of surface painted. A gallon of paint will comfortably cover about 900 sq. ft. of smooth metal when applied with a brush and about 600 sq. ft. when sprayed. (In painting a well-known bridge in India, coverage of over 900 sq. ft. per gallon was obtained). A priming coat can be brushed on to an absorbent material such as concrete to the extent of some 400 sq. ft. per gallon.

Reflectivity and Emissivity

Aluminium paint's high reflectivity to light is perhaps its best known characteristic, on account of its extensive use in brightening dark interiors and increasing the visibility of bridge spans or signposts : that it is similarly reflective to radiant heat is sometimes forgotten. Yet, applied to outdoor tanks for the storage of liquids (such as in oil refineries or storage depots for petroleum products) it minimizes losses due to evaporation by reflecting the sun's heat, and the interiors of buildings can be kept cool in the same way.

At the same time, aluminium paint is a very poor radiator of heat; therefore, it effectively reduces heat losses from steam pipes, furnaces and boiler room equipment. For this purpose a heat resistant paint is obtainable.

Lightness

Aluminium has a lower specific gravity than most other pigments; therefore, the dried paint film weighs less. This is a factor of particular importance in structures where weight saving is an advantage. Moreover, the painter can carry about three times as much aluminium paint as lead paint with the same effort.

Non-Toxicity

Aluminium paint, like aluminium itself, is completely non-poisonous; therefore, it can be used with confidence in the painting of kitchens and food stores. It is also healthier and more pleasant to apply than other paints.

Decorative Qualities

The bright, clean appearance of aluminium paint is particularly well suited to many environments, both exterior and interior. Dingy workshops or store-rooms are immeasurably freshened up by it and become pleasant to work in; it looks well on the walls of canteens, where it harmonizes with aluminium kitchen fittings; it shows off the delicate tracery of wrought iron-work that is a decorative feature of many public and private buildings; and it is unrivalled for the decoration and protection of pier and promenade steelwork to which it gives a gay and well-cared-for appearance which lasts for a long time.

A sound combination of decorative and protective qualities is obtained by the formulation of special finishes such as hammertones and polychromatics for machinery, electrical appliances, automobiles, etc.

Painting Technique

Aluminium paint resembles all other paints in requiring thorough preparation of the surface and care in application.

The surface to be painted should be perfectly dry, special care being necessary with wood and similarly absorbent materials.

Aluminium can be applied by all accepted methods, of which the most common are brushing and spraying.

As for other paints, a good quality brush is strongly recommended. To avoid streakiness and ensure maximum brilliance, the paint should be worked as little as possible: it spreads easily and the action of the flakes in rising to the surface tends to eliminate brush marks; therefore, once the paint has been laid on, leave it alone or lay it off lightly in one direction. Laying on the paint excessively thickly is equally undesirable as it may cause the film to break up when dry.

In spraying, see that the paint is not too thin or it will give a coat that is poor both in appearance and durability. As a rule, the addition of thinners should not exceed ten percent of the volume of paint. For better light diffusion, spraying is to be preferred to brushing.

PARTICULAR SURFACES

Steel

Dirt, oil and grease should be completely removed, using a mineral solvent such as white spirit. Accumulated dirt may be most easily dislodged by hard brushing, using a soap solution, followed by a clean water rinse and thorough drying. Rust and mill scale need to be removed by scratch brushing, scraping, sand blasting or flame cleaning, and previously painted metal should be freed from old loosely-adhering paint.

For priming, a composite aluminium primer, pigmented with "Indal" STANDARD Non-leafing Aluminium Paste and zinc oxide in the proportion of 33.8 : 16.7 by weight, in a linseed Alkyd medium, is recommended. Carefully controlled and impartial long-term exposure tests carried out by the British Iron & Steel Research Association showed that such a primer had greater durability than conventional red lead primer. This new primer has the additional advantages of comparative lightness, better can stability, flowing more readily under the brush, drying more quickly and to a harder film and non-toxicity. Aluminium paint should be used for intermediate and final coats.

Galvanised Iron

Freshly galvanised sheet should be allowed to weather for at least six months before it is painted. Priming is necessary only if the sheet is to be used in very corrosive atmospheres: Aluminium-zinc oxide composite primer, as described above, is then recommended, followed by one or more finish coats.

Galvanized iron that has started to rust should be thoroughly cleaned of all loose particles by scratch brush, scraper or sand blast, then printed and finish painted in the same way as the new material.

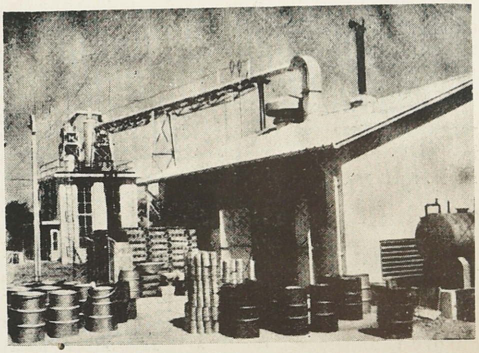
Aluminium

Normally, aluminium does not require painting, because it possesses excellent resistance to corrosion and a permanently good appearance. However, where painting is felt to be desirable for decoration, the surface of the metal should be thoroughly degreased with white spirit and etched with one of the many suitable proprietary solutions.

The metal should be primed with a zinc chromate paint and given an undercoat of aluminium paint and a top coat of the desired colour.

Wood

Aluminium paint, whether used as primer and top coat or primer only, offers a highly effective barrier to the penetration of moisture, which is chiefly responsible for the

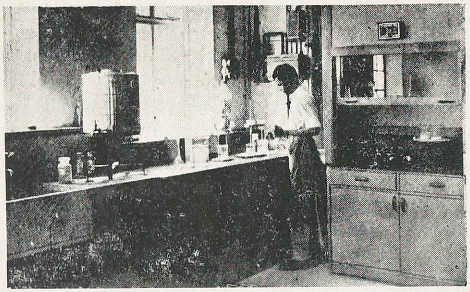


The powder blowing section at Kalwa

deterioration and rotting of woodwork. It is important, however, that new wood should be perfectly dry before the paint is applied.

Free the surface from dust and dirt by brushing, or washing with soap and water where necessary, and, if the wood has been painted before, get rid of loosely adhering paint or strip all the old paint off. Smooth off any roughness by sanding and fill nail holes and other depressions with a suitable stopper, then the wood is ready for priming.

The general-purpose aluminium paints on the market are suitable for both priming and finish painting, but to ensure the highest degree of protection the use of an aluminium paint specially formulated as a primer is recommended. Priming should be followed by one or more finish coats.



Mixing paste and medium for the leafing test at Kalwa Laboratory

With aluminium pigments it is unnecessary to use knotting for preventing resin in the knots bleeding through and discolouring the paint.

When painting wood that is to be immersed in water—for which aluminium paint is very suitable—each coat should be allowed at least a week to dry.

Concrete, Brick and Plaster

All these materials need to be weathered for some time before they are painted, and concrete particularly needs to be thoroughly dry. The usual precautions are taken to ensure that the surfaces are free from dust, dirt and loose particles, scratch brushing being the most effective means of dislodging loose grit. New plaster needs to be washed with acetic acid or one of the proprietary petrifying liquids to prevent excessive absorption. It should then be allowed to dry completely.

One coat of aluminium paint will serve for most environments, especially interiors, but two are very much better. For the best results, special alkali-resistant aluminium paint can be obtained.

Wall-Board

To obtain the best effect and economize paint, wall board, being very absorbent, should be sized with a clear varnish and, when thoroughly dry, overpainted with two coats of aluminium paint.

Canvas

Canvas coverings and tarpaulins treated with aluminium paint last longer, afford better protection and have the advantage of reflecting light and heat. Before the paint is applied, the canvas should be thoroughly cleaned and dried ; one coat of paint is sufficient.

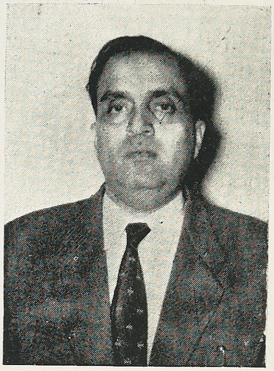
Creosote, Tar and Asphalt

Creosoted, tarred or asphalted surfaces can be covered with a primer and finish coat of aluminium paint without risk of bleeding through, if the primer is allowed to dry thoroughly before the next coat is applied. If paint of a different type is to be used as the top coat, priming with aluminium paint can still prevent bleeding through, provided the tar or asphalt has been allowed to weather for some weeks before painting.

Hot Surfaces

The usual general purpose aluminium paints withstand heat much better than most other pigments, but a special heat-resisting aluminium paint is available for covering the exterior of furnaces, boilers and similar installations. Such paint withstands high temperatures without flaking or charring.

It is important that the surface should be cleaned down to the bare metal and roughened to form a good key for the paint. No primer is necessary, one or more finish coats of aluminium paint being applied, as desired. ★



To bring up the Indian Exporter of engineering goods at par with the exporters in other countries, very valuable and brilliant suggestions are made in this most illuminating article.

PROGRESS OF INDIAN SEWING MACHINE INDUSTRY AND MARKETING PROSPECTS ABROAD

B. S. AGARWAL

General Manager, Jay Engineering Works Ltd., Calcutta

Apart from Jute, Tea, Cotton and other agricultural products, India was very well known for her handicraft all over the world from ancient times. Indian Light Engineering products were never exported to any country as we ourselves were mostly importing these things before the Second World War. Our entire requirements of Sewing Machines were coming from either England, Germany or U.S.A.

The Sewing Machine Industry in India developed very fast in a period of last 11 years, though the same started in 1938 by the farsighted Industrialist Sir Shri Ram, who thought that Light Engineering Industry could come up very well in India. To-day it is a matter of great pride that Indian sewing machines besides meeting the entire demand in the country, have also established their name in foreign markets far and near.

The Engineering Industries were started in India during the Second World War, partly due to scarcity in getting goods from abroad and partly due to meeting the requirement of Government of so many items. After the war, India achieved Independence, and the Indian leaders started thinking of saving foreign exchange for the development of the country. The Industrialists also saw a good future for the Engineering products in the country and the Government's help to develop these industries proved a boon to the country, and thus the Engineering Industries developed very fast.

Attempts were made to manufacture sewing machines in India from 1935, but it started on a bigger scale from 1938, when Jay Engineering Works became a Public Limited Company, and made plans for increased production. To-day they are producing about 20000 sewing machines per month. This Company had to struggle against various odds in procuring raw material, proper machinery and training of personnel. In 1947 protection was granted by the Govern-

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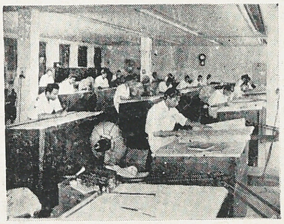
ment only by way of naming the old Custom duty as protective duty. This also was withdrawn after a few years.

The overall production of engineering goods, which was practically non-existent before Independence, rose from about Rs. 20 crores a year in 1948 to 270 crores in 1957. The Sewing Machine Industry also developed very fast, and apart from the speedy production by the Company, there are very many small units on cottage industry basis scattered over Punjab, Delhi and other parts of the country. No doubt, the Sewing Machine industry in India made a marvellous progress in a short time inspite of the competition from sewing machines coming from different countries, who had hundreds of years experience behind them, and a well established sales organisation in the country.

The success of sewing machine industry in India is mostly due to the manufacturer's farsighted policy of 'Service after Sales'. They were also able to build up a net work of sales and service organisation throughout the country, which their competitors could never do before.

The Sewing Machine Industry has not only done very good work in India, but to-day Indian sewing machines are going to over 40 countries in the world. Our sewing machines are in no way inferior to any best brand of the world is proved by the fact that USHA machines are now exported to highly industrialised countries like U.K., U.S,A, Canada, Holland, Belgium, Australia and practically all the countries on the Far East, Middle East and Africa. In the world the overall consumption of sewing machines has very much increased in the past few years and it is expected that the consumption of sewing machines will further go up very fast as it is a necessary utility article for a housewife. With the consumption of a particular article going very high, it becomes inevitable for the manufacturers to think of better efficiency, better design and better finish, and our manufacturers are very alert on this point too. They are keeping themselves posted with the day today progress made by other sewing machine manufacturers in the world and in the past few years there have been appreciable progress in the technique of sewing machine manufacture.



The Design office of the Jay Engineering Works Ltd.

Manufacture of sewing machines is a highly skilled job and involves extremely delicate operations. It represents highly advanced technique even amongst the industrially advanced countries of the world. Jay Engineering Works organised their Sewing Machine factory soon after the close of the Second World War to instal upto date machines based on model technique of manufacture. Assembly of machines is now organised on line production basis and inspection Department is equipped with upto date and sensitive testing equipment.

A new Inspection Department known as Customers Department was introduced which is responsible for final checking of each and every machine before it is sent for packing.

The Company has, besides, a very modern semi-mechanised Foundry, a wood-working and Plywood Shop fitted with modern machineries to produce laminated boards for the sewing machine cabinets.

With these improvements the Company to-day represents the highly advanced technique in the manufacturing of sewing machines not only among the sewing machine manufacturers of the country, but even amongst industrially advanced countries of the world.

For the manufacture of Industrial Sewing Machines, new Plant and equipment valued at Rs. 22 lacs has been recently installed to take up the manufacture, and it is expected that in two years its production will increase to about 2000 machines per month.

An automatic Zig Zag sewing machine which is a very intricate precision machine requiring high level workmanship has also been developed and when it will come in production within a year's time, it will be able to satisfy the much awaited need.

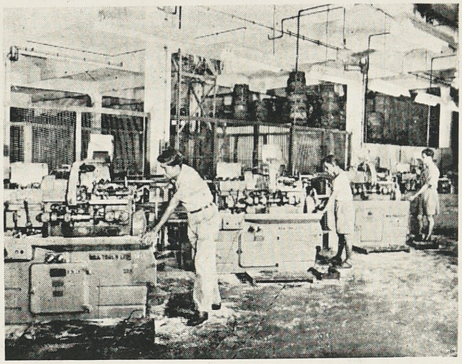
With the spade work the Company has done from 1950 in the foreign countries spending tons of money for building up export market, it can be said to-day that Indian sewing machines have got a bright future in the world market and plans have been made to export about 5000 to 6000 machines per month to Western Europe, U.K., U.S.A., Canada, Middle East, South East Asia and African countries. Negotiations have also been made to export our sewing machines to U.S.S.R., China and other East European countries, and when these are finalised successfully, it is expected that the export of sewing machines will go up to 10,000 machines per month.

The biggest problem of Indian Exporter of engineering goods is to overcome the prejudice against the Indian goods. For this he has to compete under handicap with well-established exporters of highly industrialised and advanced countries like U.K., Japan, Germany, U.S.A. etc. To break down this prejudice, Indian exporters will have to be very cautious about the quality exported, service after sales and building up of better standard of Indian business in the world market.

Another drawback which our engineering industry is facing is very high shipping freights. Attention of the Government has been drawn several times to this discriminating treatment by the Conference Lines, but still no remarkable relief has come from them, without which whatever we do, our position will always remain worst in the world market.

Unless this discriminatory treatment is properly dealt with, at least the Engineering industries in India will not be able to make much headway.

Engineering Export Promotion Council came into existence a few years back, sponsored by the Government and with the active participation of the business community; this Council has rendered useful service. They have sent various delegations to different



A view of the line of Automats in the Sewing Machine Factory

countries and have collected information and statistics from all parts of the world. They have also brought to the notice of Government how the different countries in the World are being helped by their Governments in retention of foreign exchange, incometax relief, better banking facilities, drawback duties and various other facilities, which are not available in our country. It is desired that our Government should bring up the Indian exporter of engineering goods at par with the exporters in other countries very soon. The more delay the Government is making in deciding these issues, the export work is suffering.

We are passing through the second Five Year Plan and have got an ambitious Third Plan before us, and salvation of the country lies in implementing these Plans not only to the extent they are made, but by exceeding the targets. That is only possible when we can build up our export trade. Borrowing money may help for some time, but real relief to the country will only come through exports.

Among other engineering goods, sewing machine has played its role in exports up till now very well, rather it will not be exaggerating to say that sewing machine holds an unique position in the export of light engineering goods and it is expected that in times to come the export of sewing machines will increase by leaps and bounds, to the highly industrialised countries of the world.

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Estd : 1888

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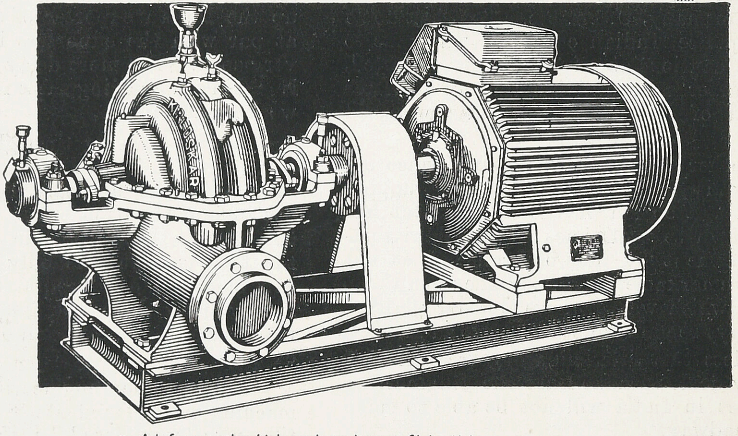
- **Cement Plants**
- **Paper Mills**
- **Chemical Works**
- **Mines and Collieries etc.**



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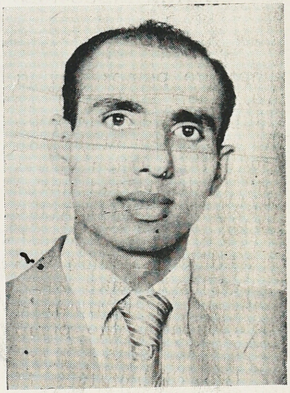
D. 23



Today various types and sizes of pumps are manufactured in India. They also earn valuable foreign exchange. They play a vital part in food production.

POWER DRIVEN PUMPS

S. M. KHANDEKAR B.Sc. (ENGG.)

Sales Engineer, Kirloskar Brothers Ltd., Kirloskarvadi

Introduction

The three essentials to a man's existence in addition to the air he breathes, are water, soil and energy. Utility services like gas, electricity, telephones, transport etc., are only secondary needs. An ample water supply has been, therefore, always of the first essentials to the progress of civilisation.

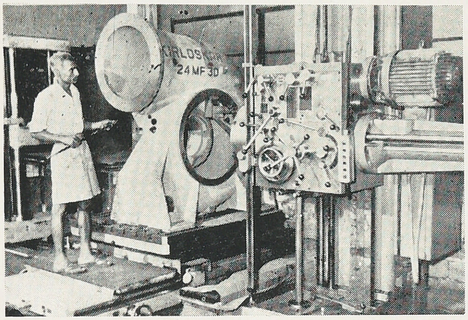
In early days, people used to inhabit places only with abundant and easily available water supply. But as the time went on settlements were made where water had to be procured by digging and pumping from wells. The development of pumping, storage and distribution were naturally the initial engineering problems of mankind.

The devices known in the earliest days of civilisations for pumping water were subsequently lost in antiquity. None the less various devices did exist and the Chinese Noria as it is known today is one of the glaring examples. It consists of a large water wheel carrying inclined sections of hollow bamboo on its outer surface. The buckets thus formed dipped into water, each time it went into, carrying a small quantity of water which spilled into a common gutter at the top. This is similar to our present day bullock rahats so commonly used in our villages.

The progress of the developments of these devices continued for thousands of years though this progress has not been of a concentrated or continuous nature. It is only towards the end of the Nineteenth and during the current century that the development has been extremely rapid and today there exists a pump for almost any application or any capacity. Pumps are fabricated for a fraction of a horsepower, or big as the ones required for the Grand Coulee Irrigation project in U.S.A. to handle 7,00,000 gallons per minute requiring 65,000 HP. Pumps are designed for a fraction of a lb. pressure up to well over 10,000 lbs/Sq. inches. Pumps are built to operate in a sterilised, air-conditioned atmosphere or to handle corrosive or poisonous fluids or installed at the bottom of 15,000 feet oil well or coal mine.

Uses

The importance of pump can never be as much overestimated as in this country. The stupendous increase in food production for the same acreage of land could hardly have been realised, had it not been for the sumptuous water pumping and distribution facilities and artificial manure. It is all the more important in our own country as we are sure to face starvation in the next five years unless we exploit the existing land to the fullest to procure 25% more food production by then. The Government has done the right thing in attaching great importance to the irrigation and pumping schemes. The farmers are given Tagai loans to enable them to purchase pum-



24 MF30 pump body on Horizontal Boring Machine

ping sets to make full justice to the water available If food, the fundamental essential of life, were the primary use, the other field of use for these pumps is the industry, without which the man could never dream the luxuries of modern life. To say the least we had to be content with the comforts of our predecessors in the remotest age. Difficult handling problems are simplified by pumps. There could be hardly any industry today which does not make use of a pump in some form or other. Pumps today serve to handle from one of the most volatile fluids, to thick mud slurry or sludge, or the worst corrosive acids and alkalis, molten lead etc., liquids with temperatures as high as 1000°F or even higher. In short anything that can be made to flow into a pump can be pumped.

Types

Pumps appear in a multitude of designs and forms and perhaps the best approach to the present day pump application is to classify them according to the principle of operation.

Centrifugal pumps are entirely dynamic and hence generate heat due to centrifugal forces, volume passing depending on the pipe system and so forth.

Reciprocating pumps are positive displacement pumps and will deliver a definite volume against pressure determined by the pipe system.

Rotary pumps are also positive, but have greater leakage clearance than reciprocating pumps and have lower inertia forces.

Reciprocating pumps are therefore used for the highest pressure and smallest quantities, while Rotary pumps are used for medium pressures and small quantities.

Definitions

Reciprocating pumps are pumps having positive displacements. Their action is as follows:—A volume of liquid is drawn into the cylinder, equal to the displacement of the piston or plunger through the suction valves on the intake stroke and is discharged under positive pressure through the outlet on the power or discharge stroke.

In case the delivery side of the pump was closed by means of a valve, the pressure would go on building up until the discharge pipe bursts or some weak component in the pump itself gives way.

Mainly there are two distinct type of reciprocating pumps. One is the steam pump and other is the power pump.

A steam pump is a reciprocating pump and a steam engine built together as a unit. Power to drive the pump is furnished by the engine. A power pump is a reciprocating pump driven by a separate source of power like an electric motor, oil engine etc. The steam pumps are further subdivided into the following categories:—

Single pump, Duplex pump, horizontal or vertical pump, crank and flywheel pump etc. Similarly the power pumps are also subdivided into single, duplex, triplex pumps etc., depending on the number of pistons they have.

The rotary type pump combines the constant discharge characteristic of the centrifugal type with the positive discharge of the reciprocating type. The flow from a reciprocating pump is pulsating whereas the one from the rotary is continuous.

Rotary pumps have been found to be more adaptable for all round purposes and therefore a large number of various forms of rotary pumps has been developed. These pumps fall into the following six basic types:

1. Cam and piston pumps

A pump consisting of an eccentrically bored cam, rotated by a shaft mounted concentrically in a cylindrical bored casing, with an abutment or follower so arranged that with each rotation of the drive shaft a definite quantity of liquid is displaced from the space between the cam and the outer casing.

2. Gear pumps

A pump consisting of two or more gears closely meshed in a close fitted casing so

arranged that when the gear teeth unmesh on one side, liquid fills the resulting space between the gear teeth and is carried around in that tooth space to the opposite side and displaced when the teeth mesh again. In this again there are two types depending upon the type of gear used.

a. External gear

Those which have all the gear rotors out externally. They may be spur, single helical, or double helical.

b. Internal gear

One gear rotor having internally out teeth meshes with an externally cut gear. They may be either spur or helical.

3. Lobular type

A pump having two or more rotors with two or more lobes on each rotor.

4. Screw pumps

A pump consisting of one, two or three screw rotors so arranged that as the rotor rotates, the liquid fills the space between the adjacent threads and is displaced axially.

5. Vane pumps

A pump consisting of an eccentrically mounted rotor, fitted with a series of vanes or blades which rotate concentrically, thus displacing or forcing the liquid with each revolution.

In this type there are two varieties, one being the swinging vane type and second a sliding vane type.

6. Shuttle block pump

A pump consisting of a cylindrically shaped rotor in a concentric casing. The rotor consists of a shuttle block and piston which are caused to reciprocate within the rotor by means of an eccentrically located idles pin.

Centrifugal pumps

As the name implies, these type of pumps generate the pressure principally by the action of centrifugal force.

This type of pump in its simplest form comprises an impeller (a rotor with vanes) rotating in a volute casing. Liquid entering into the impeller eye, is taken up by the vanes and accelerated to a high velocity by rotation and discharged into the volute casing by the centrifugal force. Due to the continuous rotation of the impeller and the throwing out of the liquid from the eye of the impeller a vacuum is created which draws more liquid This results in a continuous flow of liquid.

Types of Centrifugal pumps

Centrifugal pumps are further divided in the following categories:

1. Centrifugal or radial flow.
2. Mixed flow.
3. Axial flow.

They are also further classified according to the type of construction:

(a) (i) Volute type; (ii) Single stage; Multistage (iii) Diffuser; (iv) or Turbine type etc.

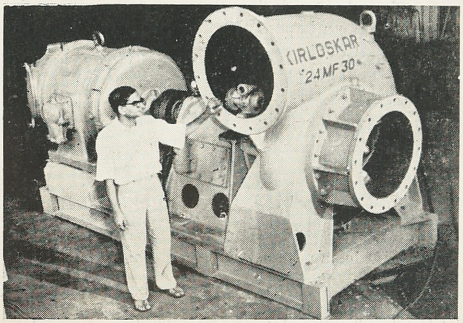
(b) Horizontal, Vertical, inclined.

Volute or diffuser type pumps are strictly centrifugal pumps in which the liquid enters the hub or eye of the impeller and flows radially to the perifery.

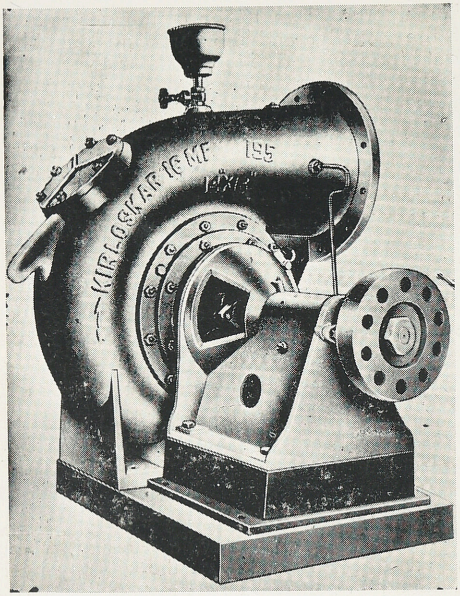
In volute pump, the volute casing, which is so designed as to convert the velocity head of the liquid generated by the impeller into a pressure head, while in a diffuser pump the impeller is surrounded by a diffuser casing which has gradually expanding passage, which changes the direction of liquid and ultimately converts the velocity head into pressure head.

Mixed flow pumps

In mixed flow pumps the head is developed partly by centrifugal forces and partly by the lift of the vanes on liquid. The liquid enters axially at the impeller hub and dischar-



Capacity 18000 gpm at 30 ft. head. 580 rpm. 250 h.p. motor



16 MF 195 pump

ging both in axial as well as radial directions, and hence the name mixed flow.

Axial flow

This type of pump, many times also called as propeller pump, develops its head mostly by the lifting action of vanes on the liquid.

Indian Industry section

The manufacture of centrifugal pumps started in India only in this century; but with the passing of time it has made great striding progress. Today the industry manufactures various types and sizes of pumps, thus saving a very large amount of valuable foreign exchange.

Today there are as many as thirty to forty small and big manufacturers who are registered on the Government list. There are also some firms manufacturing only a small quantity, not borne on this list. A few names of the firms who are today the leading manufacturers in India are given below. Against each name the sizes of pumps they can manufacture and also the quantity manufactured per year is given. Though this list is not complete and exhaustive, it certainly gives one an idea of present status of this vital industry in India.

LIST OF MANUFACTURERS

No.	Name of firm	Type & Size of Production		Capital/Yrs. in Nos.
1.	Kirloskar Brothers Ltd., Kirloskarvadi.	Centrifugal, Power Piston Spl. pumps. each	1" to 36"	26,000
2.	Jyoti Ltd., Baroda.	Centrifugal, Power Piston Bore-hole Turbine etc.,	1" to 24"	4,000
3.	Dandayuthapani Foundry Ltd., Coimbatore.	Centrifugal, Reciprocating,	3/4" to 4"	15,000
4.	Forge & Blower Ltd., Ahmedabad.	Centrifugal	1" to 6"	7,500
5.	Best & Co., Ltd., Madras.	Centrifugal	1" to 8"	8,400
6.	Modern Engg. & Moulding Co., Ahmedabad.	Centrifugal	1" to 6"	5,400
7.	British Electrical & Pumps Ltd., Calcutta.	Centrifugal & Centripetal	1" to 8"	10,000
8.	Hindustan Industrial Co., Delhi.	Centrifugal & Bore-hole	1" to 14"	1,760
9.	Ruston & Hornsby Ltd., Bombay.	Centrifugal & Bore-hole	1" to 6"	2,000
10.	Delta Engg. Works Ltd., Meerut.	Centrifugal ,,	2" to 12"	960
11.	Johnston Pumps India Ltd., Calcutta.	Bore-hole Turbine	upto 12"	350

The pumps manufactured are various of types and cater to the demands of many industries. Below are given a few types of pumps manufactured and their applications. This gives a good idea of the large field covered by the present range of pumps manufactured in India.

TYPES

1. Centrifugal Pumps—Single, Two stage & Multistage for handling water. (Water Works, Industries etc.)
2. Reciprocating pumps.
3. Self Priming Pumps.
4. Bore-hole Turbine Pumps.
5. Chemical Pumps—(for acids, slurries etc.)
6. Sewage Pumps—(Non-clogging type)
7. Pumps for Sugar & Paper mills.
8. Fire fighting trailer Pumps.
9. Petrol Pumps.
10. Petroleum dispensing & Metering Pumps.
11. Monoblock pumps.
12. Rota or Rotary Pumps for handling viscous fluids.
13. Mixed flow and Axial flow Pumps.

A number. of firms have been granted licenses for the expansion of their present manufacturing capacity. This expansion capacity is about 22 to 23 thousand pumps per year

In addition to the above, a large number of firms have been granted fresh licences to establish new factories for the manufacture of different types of pumps.

These firms will shortly go into production which will increase the manufacturing capacity by another 20 thousand pumps.

This putting all the above in exact figures the projected capacity for manufacture before the end of second five year plan will be as under.

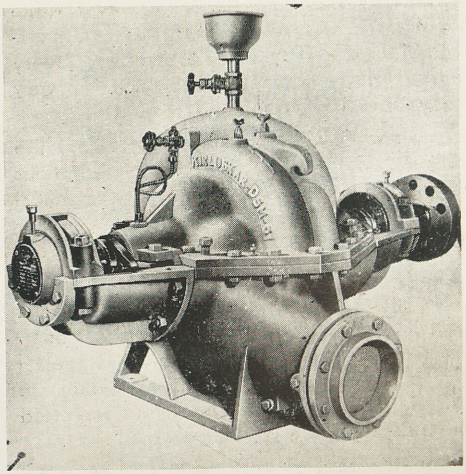
Existing capacity————————	68716	Nos.
Expansion granted———————	22668	,,
New licences ————————	19818	,,
Total	1,11,202	,,

Below are given the production figures for the different types of pumps as maintained by the Development Wing. This very clearly shows the rapid progress made by this industry.

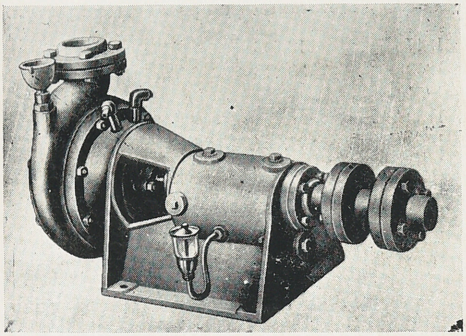
Year	Horizontal pumps	Vertical pumps.
1947	18,666	35
1950	30,218	74
1951	47,861	128
1952	31,776	275
1953	24,757	514
1954	28,054	561
1955	33,454	987
1956	45,231	1,650
1957	61,853	1,923
1958	74,450	1,206

However, it must be noted that the above production figures are only for those firms who are on the list of the Development Wing. There are a number of manufacturers who are borne only on the list of State Governments and a small lot who are not on any industry list. It is estimated that the total production of such units will not be less than 10,000 nos. per annum.

The Planning Commission has estimated the country's demand to be 86,000 by 1960-61, with the present production of Industry and the new industries that would be coming up by then, this demand will be exceeded provided the demand is fully maintained.



DSM—61



Type "CH" Pump for Chemical Industry

Raw materials

The main raw materials required for the industry are pig iron, steel, ball bearings, copper (for gun metal and bronze), coke etc.

Though most of the raw materials are available from indigenous sources, the supply is not sufficient to meet the demand. Particularly there is great shortage of pig iron. However, with starting of the new steel plants at Bhilai, Durgapur and Rourkela, there will be considerable ease in the supply of pig iron and steel. Supply of ball bearings is however quite a problem. The types of bearings manufactured in India are very few. Also the delivery of indigenous, manufactured bearings is very prolonged and uncertain.

The normal steel shafting required for the pumps is generally available from indigenous sources but for the special pumps like chemical pumps etc., stainless steel is necessary. For this, we have to fully depend on Imported supplies.

Similarly for the manufacture of special metal like bronze, Stainless steel, Monel, Niresist etc., a number of non-ferrous metals like Cu, Tin, Lead aluminium, Nickel, etc., are required. Most of these have to be imported as the indigenous supply is insufficient.

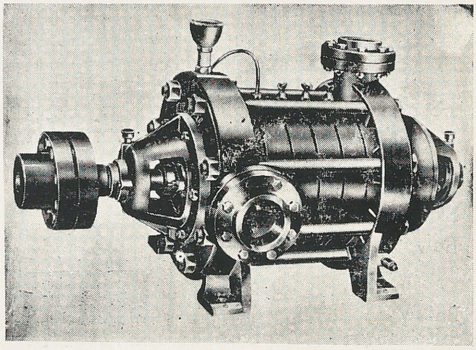
Another vital raw material is the gland packing used in all types of pumps. Till sometime back most of this was imported from U.K. or Continent. But now a new plant has been put in or near about Calcutta which will shortly be able to meet this demand.

Overall it may be said that barring for a few essential items and material, most of the raw materials are available from indigenous sources.

It is learnt that a new process has been developed by the National Metallurgical Laboratory at Jamshedpur, whereby stainless steel can be manufactured without the use of nickel.

Till this date most of the requirement of the chemical industry was being met from Imported material. However, with the installation of a high frequency furnace by Ms. Kirloskar Brothers Ltd., at Kirloskarvadi, they will now be able to meet to certain extent this special requirement. It is also learnt that Ms. K.S.B., a very leading German firm of pump manufacturers has decided to put up a new plant at Pimpri near Poona to manufacture different types of special pumps.

Till 1950, a lot of pumps were being imported. These were of all sizes and types. Since 1952 or 1953, the Indigenous production



Type "MN" Multistage Pump for boilerfeed, mine - drainage etc.

has increased considerably in quantity as well sa in the maxm. size of pumps manufactured. Government, therefore, decided to give protection to the industry by banning the import of pumps of sizes below 6".

It must be admitted that the protection by the Government, the acute shortage of foreign exchange and the cooperative spirit of the industry and other consumers to give a hand to this budding industry has considerably helped this industry to come to its present stage.

Not only have we reduced our imports of pumps to the smallest extent possible, but we have also started to export them to the nearby countries like Indonesia, Burma, Nicosia, Cyprus etc., most of the eastern countries.

The quality and finish of our pumps is equal to that of any of the imported pumps. Yet because of the keen competition from the Western countries, specially the continental (Germany, France, Belgium etc.) countries, it has not been possible to make the export to the desired extent. However efforts are being made, both by the industry as well as the Government to carry out a lot of propaganda, advertising and adopt various measures to reduce the prices to bring them in line with our foreign competitors.

Export figures for the year 1957 and 1958 are given below :

Year	Power operated Centrifugal Pump	Hand operated pumps
1957	Rs. 1,17,111/-	Rs. 4,478/-
1958	Rs. 2,50,050/-	Rs. 24,132/-

This clearly shows that the trend of export is on the rising line. The export target fixed for the year 1959—60 is 6000 Nos. Pumps.

In conclusion, it may be said that in a very short period the country will not only be self-sufficient but will be exporting large quantities of this commodity all over the world.

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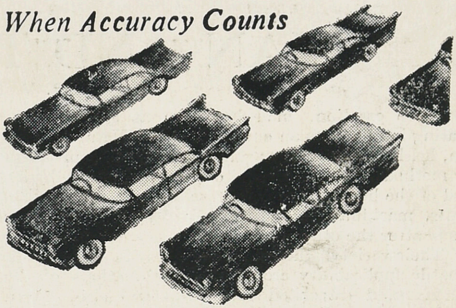

The moving parts in a motor car must be ground to very close limits of accuracy and with good finishes, so as to reduce friction, and so prolong engine life. The automobile industry is therefore particularly dependent on precision grinding wheels, to ensure greater accuracy.

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Z. 563

With the zeal of a creative artist Shri Narayan describes how machinations have merged man with the machine.

MAN AND THE MACHINE

R. V. NARAYAN

Since creation, man has been at the game of creating implements an engineer's job. Nature's creation, he, has been trying again and again to copy her in her methods. He has been often dictated to by his need of the hour and so we notice equipments, instruments, machines, tools and many gadgets are coming in one after the other and not all of them together.

Their variety, their fineness, their intricacies and versatile applicability are all the machinations of the human mind translated into shape and size. From simple tools, man has made machines that can perform almost all the acts of man. One can perceive if he watched a printing machine at work, how many operations are simultaneously done by the automatic printing machine? Switch on, you notice, it does almost all the jobs a man does, feeding the paper, pressing it on the types to take impression, picking it, stacking it, rejecting it if it is not of proper size, and so on. Take the sewing machine which is power operated. You have to only switch on, mark the pattern and place the cloth and the switching is done. Man's machinations have gone on in inventing devices to to such an extent as is said to prove the existence of God. Perhaps, this is the most clever thing a machine can do. Everything is being done with the advancement of human existence in this world and science, his own understanding of nature and her creations, that we could to-day say, the great gulf that was between the man and the machine in earlier days is considerably narrowed in this twentieth century. Calculations, deductions hitherto the exclusive privilege of the mind to perform are being done with greater speed and accuracy by mechanical and electronic devices.

The last two decades have become epochal in that we have been fed a lot about wonder machines. They are streamlined by the press, they have been the subject of nation wide radio talks and, perhaps, there is no channel of publicity that has not flooded us with news of technical developments especially on calculating machines, automatic pilots, anti-aircraft fire control devices, guided missiles, chess-playing machine and so on and so forth.

It does not exercise our minds generally so much, as when we hear of the discussions of the nervous system, and our thinking machinery alongside of the electronic and mechanical devices. This gears us up to think and wonder how among the ranks of the latest electronic and mechanical developments, the mathematicians, the engineers, the doctors and the philosophers are all roped in.

This naturally urges us further to probe into the ultimate capacity of machines and the principles governing their action. A study into this has been successfully attempted and it has earned a name too:—Cybernetics. This study covers the field of machine-man actions.

By and large, man has transferred his performance of arithmetical operations to the machine. This machine refers, stores up information and performs operations in an orderly way selecting alternotive procedures and exercising judgment which and when to choose. It delivers the results in the same code as is fed to the machine.

You must have heard of the "robot" depicted by the Czech dramatist Capek—an automaton which can act human like think, be obedient and intelligent. This idea has been developed and today man has been able to make a chess playing machine—chess play we know is one that exercises one's mind the most.

In the field of Neurology too, the machine has made its mark—model organisms are built to exhibit discriminatory responses and search for environmental optimum conditions. Even conditioned reflex type of learning has been attempted to be imitated by mechanism.

Machines are built to exhibit purposive behaviour as also to learn by trial and error. Mechanical Maze runners which learn to solve mazes somewhat in the manner of rats, have been devised and built. The purposive behaviour machine acts like an organism aiming at a fixed goal with flexibility in following the route. The feed back principle is employed in building up equipments and devices which will maintain a state of equilibrium as in the case of volume controls in Radio, or as in the case of the mechanism used in automatic aircraft fire control. Aiming and firing at a moving target needs succesive approximations and gun control—these are achieved rapidly and automatically by computing machinery.

Another advance in the application of feed back principle is in translating the principle involved in the constant body temperature of the human being and the animal, by regulating heat production and loss by decrease or increase. The device contrived by the engineer is known as the Thermostat and it is verily a copy of the apparatus in human beings and animals. It is an organ situated at the base of the brain and it is operated by the autonomic nervous system. This system is associated with the control of the internal rather than the external environment of the organism. The feed back mechanism alerts several servo-mechanisms which sets right the temperature condition.

The central nervous system composed of the spinal cord and the brain control much of the involuntary and all the voluntary human and animal action. If we may apportion the functions, the brain is associated with mental processes. Scientists have not established with increasing evidence in support the working of the central nervous system is copied by engineers in devicing their control mechanisms both as to transmission storing of and registration of messages. Electro encephalograph has been devised to record the sum total of the electrical activity of the brain. The electronically operated computing machine is a replica of our brain. The functional memory, the problem solving behaviour, learning behaviour and the purposive behaviour are all now translated into machines.

One should say on a study of the advances in Science : the mathematician, the psychologist, the philosopher and the engineer all are one in that they mutually copy the working of the functions of God's creations to build new things and explain human and animal actions in engineering terms. In other words, human machinations have merged man with the machine. ★

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Shri Agrawal's analysis is masterly and very pensive. It is high time we explore all avenues of increased production and earn valuable foreign exchange.

IDLE CAPACITY IN THE ENGINEERING INDUSTRY

R. M. AGRAWAL

President, Engineering Association of India, Calcutta

Growth of the Engineering Industry is the index of the growth of industrialisation in any country. Prior to Independence of India, there were only a few Engineering Industries. Since Independence, however, these industries have recorded the maximum rate of progress. The following Table will illustrate this:—

	Index of Industrial Production				
	1951 (Base)	1954	1955	1956	1957
General (All Industries)	100	112.9	122.1	133	145 (approx.)
General and Electrical Engineering Industries	100	151.9	183.1	218.1	245 (approx.)

Some important items of production have registered the following progress during the past decade:—

PRODUCTION OF CERTAIN ENGINEERING ITEMS

ITEM	1947	1957
Bicycles	49,000 Nos.	About 800,000 Nos.
Automobiles	Nil	,, 33,500 ,,
Sewing Machines	6,000 ,,	,, 164,000 ,,
Power-driven Pumps	6,000 ,,	,, 62,800 ,,
Electric Fans	60,000 ,,	,, 513,200 ,,
Electric Motors	38,000 H.P.	,, 452,500 H.P.
Steel	8.5 lakh tons	,, 13.4 lakh tons
Industrial Machinery	Almost Nil	Worth Rs. 35 crores.

These production figures may look impressive when compared with those of 1947 or even 1951. But when compared with the vastness of the country, its natural resources, its population and other potentialities, there is a considerable leeway to be covered. Many countries smaller than India, have larger production capacities. India is planning to produce 4.5 million tons Steel in 1960—1961 whereas, small countries like Japan, England etc., have already got much higher steel pro-

duction. Japan is in the neighbourhood of 10 million tons and England is in the neighbourhood of 20 million tons. Annual per capita consumption of Steel is 1178 lbs. in U.S.A.; 837 lbs. in U.K.; 243 lbs. in Japan and only 19 lbs. in India.

Production figures for 1956 for some items in other countries are as under:—

ITEM	Production in 1956 U S A.	U.K.	Japan	India
Motor Vehicles	69.20 Lakhs	10.04 lakhs	10.2 lakhs	32,000
Radios	139.8 Lakhs	16.8 lakhs	30.6 lakhs	1.5 lakhs
Textile Machinery	—	Rs. 102 crores	86.6 crores (1955)	0.82 crores (1955-56)
Machine Tools	—	Rs. 114 crores	—	0 82 crores

Unfortunately, the importance of Engineering Industries has not been sufficiently recognised in India except in theory. Had it not been so, there would not have been a serious set-back in production in Engineering Industries as it is now at present on account of acute shortage of raw materials and components. The Annual Report of the Ministry of Commerce and indus. try 1957, revealed that production was less than capacity in a number of Industries and idle capacity in a majority of cases was to the extent of 40% to 80%. Some of the Industries mentioned in the report which have got idle capacity are as under:—

Extent of idle capacity. (the figures indicate the number of industries in each category.)

Industry Category.	0 to 20·/.	21 to 40·/.	41 to 60·/.	61 to 80·/.	Above 80·/.	Total Units
Mechanical & General Engineering	6	5	7	7	3	28
Industrial Machinery	—	1	—	1	1	3
Tools	2	3	2	3	—	10
Automobile and Ancillaries	1	4	2	3	2	12
Diesel engines, Pumping sets, etc.	1	4	3	—	—	8
Electrical Engineering Industries	1	4	5	1	—	11
Metallurgical Industries	2	2	3	3	2	12
Chemical Industries	17	18	27	27	16	105
Mineral Industries	1	7	8	1	2	19
Timber and cellulose Industries	3	1	3	1	—	8
Leather and Rubber Industries	5	5	6	6	1	23
Other Industries	4	3	6	5	6	24
Total	43	57	72	58	33	263

The foreign exchange difficulties are principally responsible for this situation. Often it is said by Government spokesmen that the difficulties of Engineering Industries are of their own making They have expanded very fast and have been responsible, to a very great extent, for the draining away of our foreign exchange resources. But this not a correct appraisal. The Engineering Industries may have consumed a large amount of foreign exchange in the form of import of capital good and also raw materials and components, but they have also produced goods which have saved the country's foreign exchange far in excess of the foreign exchange which they might have consumed. Apart from food, the real drain on foreign exchange resources comes from those basic and heavy Industries which take a long time to commence production and to earn foreign exchange. This is not to dispute the importance of basic industries in an expanding economy like ours but to stress the fact that the foreign exchange resources that have already been spent in establishing industries and where production capacity has been developed should not be kept idle. Otherwise, it would be prima-facie, a waste of national resources which are so scarce at present.

BHILAI - a name to conjure up! It stands as a magnificent monument of Indo-Soviet colloboration.

BHILAI-SYMBOL OF SOVIET-INDIAN FRIENDSHIP

N. KAPORULIN

Assistant Chief, Iron and Steel Works Construction Administration, U.S.S.R.

Russia was far behind many countries of the world in her industrial development before the Revolution. Especially big was her lag in heavy industry, iron and steel in particular.

In the forty-two years of Soviet power, Soviet industry has grown immeasurably and, despite the two wars, has advanced to second place in the world (after the USA) for gross output of the basic industries.

The growth of the iron and steel industry was especially marked after World War II: in 1958 the Soviet Union produced 39. 6 million tons of pig iron, 54·9 million tons of steel and 42·9 million tons of rolled metal, with a 7 per cent increase over the preceding year.

Such a rate of growth in metal output, surpassing other countries, was a result of putting new factories and units into operation and of constant improvements in the technology and organisation of production. New equipment also played an important role. Soviet metallurgists tirelessly work on improving the technology of production. Soviet iron and steel works attain much better results than the works of other countries at present.

While constantly extending and improving its iron and steel production, the Soviet Union is rendering technical assistance to other countries.

Widely known is the Lenin Iron and Steel Mills in Poland in the construction of which Soviet experts helped a great deal. The same assistance was rendered to the People's Republic of China in the construction of steel mills in Anshan, Wuhan etc , and to Bulgaria, Hungary, etc.

This assistance consisted in drafting projects, delivering complex equipment, training workers and sending Soviet experts to help put enterprises and units into operation.

An agreement on the construction of a steel mill in Bhilai was signed between the Soviet Union and India in 1955. The agreement envisaged delivery of structural steel, pipes, refractories, and other materials from the USSR.

All the latest achievements of the Soviet iron and steel industry are being made use of in building the steel mill in India, so that it may be on par with the most modern and up-to-date iron and steel plants in the world today.

Since the time for the mills' construction was a rather short one, it was also necessary to make good use of the highly developed Soviet building technique.

Slightly more than three years have passed since the conclusion of the agreement and the steel mill is already functioning in Bhilai, formerly a little-known village. It has peen producing coke and pig iron for quite some time now and is beginning to manufacture steel.

Such a brilliant result is to be explained first of all by the close co-operation between the two countries. The Soviet side prepared the blueprints in a very short time (tens of thousands of blueprints were drawn during a year) and manufactured and sent to India more than 300,000 tons of various equipment necessary for the mills, construction.

The Indian side provided large quantities of building materials and workers of diverse trades.

But what mattered most was the sincere desire of both sides to carry out the common task rapidly and efficiently.

The workers and engineers of the Soviet enterprises which manufactured goods for the Bhilai mills clearly realised that only timely fulfilment of the orders and high quality of the product, as well as the high skill and great experience of the experts sent to India to help on the spot, could facilitate the task of building, in a short time, a mill that would be a worthy monument to the friendship of the two people.

That is why all Soviet workers concerned with the construction of the Bhilai mills in one way or another are now closely watching the work of its first units, which start operation one after another. The stacks of the first coke battery are already emitting smoke. The noise of the machines at the electric air-blowing and pumping stations is heard day and night.

Indian specialists confidently control the machinery. Their experience is growing with each passing day. Already now pig iron made at the Bhilai Mills is going to the open-hearth furnace shop where Indian specialists are beginning to make steel out of it.

The day is near when Indian building workers and assembly-men will move to other construction sites where they will say with pride that they learned their trade from their Soviet friends.

The versatile uses of plastics are brilliantly portrayed here.

PLASTICS EXPAND THE MATERIAL BASE OF GENERAL ENGINEERING IN THE GERMAN DEMOCRATIC REPUBLIC

GERHARD H. KEGEL

When in the engineering industry already quite some time ago bearings from bronze or steel had been replaced by plastics-bearings the sometimes rather depreciatory talking of plastics as substitute or emergency solution soon faded. The plastics stood the test as completely as new materials with outstanding qualities.

The foot-bearings of a spindle, which in a spinning-machine has got to revolve quite fast, had at first been made from bronze, then from hardened steel. The steel-bush was compared with the plastics bearing on assay. After a rut-time of more then 300 hours the hardened steel-bush as so-called "substitute fabric" did not exhibit any attrition.

Cast iron-bushes as parts of the bearings in the steering-rods of locomotives were waste after 1.000 service kilometres. Plastics-bushes proved a life of eight to ten times as long. The durability, however, was only one of the advantages of the new bearings. With an overheater now the shaft remained undamaged; pushes and vibrations were absorbed by the plastic-meterial.

These first examples demonstrated already that the plastic materials are an important enlargement of the material base in the general engineering industry. Today everyone knows: without plastic materials a further technical progress is hardly imaginable. The development of chemistry with a particular view to the plastics is an essential for the further growth of national economy in the German Democratic Republic up to the year 1965.

Today already it is generally well known that plastics are systematically being developed for special spheres of application. In future this research work will still yield enormous technical surprises. But also for the meanwhile known plastic materials specific qualities can already be summed up, which show proof of a superiority towards the traditional materials metal and wood in many

application spheres. The outcome is quite a sum of technical and economical advantages. So, the chipless shaping of most of the plastics even with most complicated parts must be stressed. The good electrical qualities and the low weight of most of the plastics are worth mentioning. But also the noise and vibration suppression and, above all, the wear-resistance are outstanding. Finally, plastics require less maintenance, repairs hardly occur, and even the assemblage will be found easier.

The plastics-chemist does not exaggerate when stating that the now newly developed plastics, among them primarily the cast resin glass-fibre plastics, with their mechanical qualities may easily compete with steel, iron, and the other heavy and light metals, as well as wood—that they are, however, much superior to them because of their low weight, their resistance to corrosion and strength properties towards chemicals.

With the significant chemistry programme of the GDR the largescale production of these plastics comes into being. In the use of semi-finished plastic products on the international scale a certain relation in the distribution of the total supply to the application spheres has been brought about. So, in 1957, 70 to 80 per cent of the total supply of plastics in the world (i.e. about 3,800,000 tons) were used for technical commodities, and 20 to 30 per cent for consumer goods. From that precentile proportion it becomes clear that the meterial base of general engineering today already is subject to considerable changes.

In this connection it proves useful to differentiate between the meanwhile customary plastics and the recently developed materials of the last years.

So, for instance, the pheno-plast and amino-plast press-materials still play an important part in electrical engineering, although they belong to the oldest kinds of plastics. Hard-paper and hard-tissue are derivative products and rank with the acknowledged construction-materials for operoting elements in apparatus-building. But also the good electrical insulation-capacity of the plastics has almost superseded the ceramic insulators in radio and telecommunication engineering.

In transformer and switch building more and more newest layer-plastics on siliconic base with either glass-fibres or asbestosfibres are applied as support materials for highly stained parts, which must be of great immunity to heat. Up to now, only hardly obtainable securities can be achieved with the help of plastics, when the gears are severely overcharged. In very many cases it will be possible also to build smaller motors and transformers with the same output.

In the electrical engineering industry recently the epoxideresins met with particular interest. They connect metal with metal, but also with glass and other plastics. Expoide-resins are being used as insulating-materials of transform guages. The most important application, however, is the use of these resins for adhesives in general and electrical-outfit engineering.

Jet planes running at supersonic speed, for example, require an unriveted fitting of material. Rivet-heads would cause air whirls. Here, the epoxide-resins render a satisfying technical solution possible by yielding insoluble fittings also of steel and aluminium parts.

The particular interest of all branches of general engineering find the glass-fibre supported poly-ester resins, all the more since for that new plastic also the raw-material base is especially favourable. That is to say, the material consists for about 50 per cent of glass, which in its turn is composed for nearly

60 per cent of sand (silicated acid). In the GDR the erection of a large glass-silk plant has been planned, which will produce sufficient semifinished poly-ester goods. For the time being, the combined Buna works put the main stress on the production if poly-esters, whereas the Leuna works concentrate on the production of epoxide-resins.

The application sphere of poly-ester resins is extraordinarily wide. At present they are used in general engineering for ducts, pedestals, switch-cases, engine-guard switches, amplifyer hoods, electromotor boxes, top-fasteners for power current-insulators, ignition-coil buttons, and other purposes. But even canoes, aerial parts, umbrella shafts, and ski-sticks as well as window frames are produced from this material. Even as materials for hotwater mains and central heatings-systems poly-ester and epoxide-resins are suitable.

Of the almost universally applicable material, the excellent mechanical qualities are particularly worth while mentioning. At constant straining poly-ester surpasses even light metals of high value. Especially the air-craft-industry makes use of that, producing already plane-wings, whole fuselages, stabilization superficies, pressure receptacles, and air-ducts from glass-fibre supported poly-ester resin.

In its outstanding qualities the material poly-ethylene equals the importance of the poly-ester resins. It has an especially low weight and is lighter than water. Poly-ethylene resists acids and lyes, is immune to heat and cooking, and is sterilizable. It can be submitted to any kind of manufacturing methods. Thus, it can be manufactured for chiplessly shaped die-casting products, for ducts, cable-covers, foils, bottles, and boxes of any size. In 1960, the first 1,000 tons of poly-ethylene will be waiting for manufacturing in the GDR. Also a soon production maturity of the poly-ur-ethans may be counted upon. With their excellent mechanical qualities they will supply the poly-amides—will, however, as varnishes and adhesives open quite new spheres of application for the plastics. The poly-ur-ethans are rubber-like materials, which are oil and petrol-resisting, tenacious and inlacerable, and highly immune to age. They may be done into foam-products, but also give suggestions for totally new constructions.

Poly-styrol die casting-materials are permanently gaining new application spheres in high frequency engineering. Foils from this material are especially well suitable for the insulation of conductors in carrier-frequency cables, and are being used in the production of poly-phase and wound condensers.

Most likely, the largest sphere of application still is possessed by poly-vinyl-chloride. This already has become a standard product, which is always gaining new possibilities for use. General engineering applies poly-vinyl-chloride in any of such places where for armatures, cases etc., corrosion and acid resistance has to be achieved. In the television industry nowadays poly-vinyl-chloride with softeners is applied for insulation of leads and cables because of its low inflammability.

In car industry with its products for rail, water, and road service plastics have become indispensable pre-conditions for new technical solutions. For completion ship-building uses plastics in order to save as much weight as possible—uses at the same time—however, the advantages of the plastics towards the traditional completion meterial wood, as e.g. the low inflammability. Nowadays, even lifeboats are being made from poly-ester resins, to gurantee for boats able to offer resistance in distress at sea.

Stronger than steel, more durable than light metal, lighter than wood, more acid-resisting than rubber, and almost immune to any kind of corrosion - about like that an incomplete list of some outstanding advantages of plastics would have to be. In this connection, however, it is important, above all, that practically there are no limits set to the production of plastics. Therefore, they will prevail in the material base of the future. ★

STEEL WORKS ELECTRIFICATION

The £13M expansion project of John Lysaght's Scunthorpe Works, planned in 1956 and begun in 1957, is now nearing completion.

As well as covering the installation of a new sinter plant, new blast furnaces, coke ovens and a complete new by—product plant, the scheme also makes provision for extensive development of electrical supplies.

The present maximum demand of the works is about 20 MW, but this will increase to 28 MW by 1960 when the scheme is to be completed: in order to accommodate this increased inload the existing works 3.3 kV distribution system is being reinforced by an 11 kV system. The Y.E.B. 33 kV supply is switched in the works and transformed to the distribution voltage at three points. The peak demand on this supply is about 10 MW, the remainder of the load being met by Lysaght's generating plant which consists of three 2 5 MW and two 5 MW turbo-alternators. An important part of the expansion scheme provides for the replacement of the three 2.5 MW alternators by two 12 MW units

All switchgear for the 11 kV system has been made and installed by Cooke & Ferguson Limited, a member company of the Crompton Parkinson Group.

The main 11 kV, 16—unit switchboard is located in the Lysaght power house building and is of the duplicate busbar type equipped with translay protection on all transformer units. The switches controlling the incoming supply from the Y.E.B. are equipped with directional overcurrent protection, set for power flow away from the 11 kV bars.

Fire prevention walls divide the board into two sections, one of seven units and the other of eight units, with a bus section circuit breaker linking the two sections through the walls.

Ultimately, the switchboard will control duplicate feeders to the coke ovens, sinter plant and 3.3 kV system together with connections to the four alternators and a feeder to a cooling - water pump house on the nearby river Trent. A bus coupler is provided for each section of the switchboard and provision is made for further extensions when required.

An outstanding feature of the electrical work is the new power station control room which is positioned to give a clear view of the turbine floor The scheme of decoration is carried out principally in Eau - de - Nil and the room is lit by a suspended illuminated ceiling in which emergency lighting arrangements from the mimic diagram which forms the control room wall; the diagram incorporates combined control and indication switches, the indication being of the flashing discrepancy type.

In the centre of the room is a 6 - unit Cooke & Ferguson control desk for the four turbo - alternators and the two 33/11 kV transformers. The synchronising scheme involves the usual interlocking features and was developed specifically to suit Lysaght's requirements. Two desks are provided for the control room staff, the desk for the control engineer including an illuminated annunciatory alarm system.

As a result of the expansion scheme, John Lysaght's Scunthorpe Works will be in a position to produce 800,000 tons of steel annually—about 3% of the national steel output.

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The spectacular rise of Slovakia to Industrial glory is brilliantly penpictured in this most enthusing article.

SLOVAKIA-THE NEW INDUSTRIAL REGION OF CENTRAL EUROPE

ING. JOZEF HVORECKY
First Deputy of the Commissioner Chairman of the Slovak Planning Office in Bratislava

The Czechoslovak Republic is realizing the principle that in Slovakia which has been a poor agricultural country serving only as a reservoure of cheap labour an extensive and advanced industry should be built up as quickly as possible. In this way for the first time in history conditions for political, economic and cultural growth as well as for an independent prosperity of the national life of the Slovaks are being created. These were the aims for which 15 years ago in the August and in the following days during the 2nd World War and the most brutal rule of the Nazis the people of this country fought with arms in their hands during the Slovak National Uprising.

The very low economic standard was the main cause of the general backwardness of Slovakia. Industry in Slovakia underwent stagnation. In 1913 for example roughly 92,000 persons were employed in industry, in 1930 only 89,000 and at the end of 1937, 103, 900.

The major part of the inhabitants was therefore dependent on agriculture /56- 60% of the population/, which however was very dispersed and because of its unproductive production offered only a miserable poor living to hundreds of thousands of inhabitants. Farmers did not possess land, which was proved by the fact, that farms up to 5 hectars—which constituted 72%—i.e. the main part of all agricultural holdings—did not own more than 16.7% of all land. Lack of work and land often led to inhuman exploitation of the working man and to emigration on a gigantic scale.

The years since the liberation of Czechoslovakia are marked by a great economic and cultural development, unprecedented and unthought of in the past. By the systematic realization of socialist industrialization of Slovakia a swift economic prosperity, changing this until now backward agricultural country into a country with a technically advanced modern industry, was achieved. Since 1948, 202 new industrial plants were put into operation in Slovakia, and in 132 industrial plants extensive reconstruction has been carried out.

When one compares this development of industrial production with certain economically advanced countries since 1937, one has to admit that the highest tempo of industrialization has taken place in Slovakia.

	1937	1948	1957
Czechoslovakia	100	108	293
Slovakia's participation	100	196	677
Belgium	100	107	152
Italy	100	98	219
German Federal Republic	100	71	241
Austria	100	92	247
Sweden	100	150	197

This swift growth of industrial production made principal changes in the social structure of the population possible and signified a very important increase in the economic potential of Slovakia, even in comparison with highly advanced capitalist countries.

Structural changes took place above all in favour of heavy industry, especially engineering, electric power production and in the production of building materials. Whereas in 1948 engineering participated in the whole industrial production with less than 15%, it participated in 1958 with almost 20%.

The swift development of industry in Slovakia is based on natural and economic conditions which are given mainly by the natural wealth, especially of mineral raw materials, the possibility of development of agriculture and sufficient labour. An inevitable condition was the extensive systematic aid of the Czech working class with the introduction and mastering of new productions and the permanent developing of economic co-operation with the countries of the socialist camp mainly with the Soviet Union.

Following from the economic and natural conditions the existing development of industry was vere versatile. It was not only the production of former characteristic branches which increased several times, as for example the textile, food and partly also engineering industry, but also a whole number of new industries were founded. A powerful metallurgical industry is being built up which is represented by a large plant for the production of aluminium in Ziar on the Hron River. A number of new, technically very exacting industries were founded, such as riverboat building in Komarno, production of chemical equipment in East Slovakia, building and roadbuilding machines, motor-cycles, machine tools, television sets, ball-bearings and products of low voltage electrical engineering. All industries attained a high technical standard and their products are being successfully exported to the most different countries all over the world. The growth of technical equipment of industry is at the same time linked with the considerable concentration of production.

By this revolutionary industrial development Slovakia's share has already reached 16.8% of the all national industrial production. This immense leap is proved by the fact that by this volume of industrial production Slovakia attains half of the output of Czechoslovakia's industry in 1937 when the Czechoslovak industry belonged among the 10 industrially most advanced countries in the world.

In the sector of agriculture outstanding success was achieved mainly by gradual liquidation of very dispersed fields and in the growth of technical equipment of agriculture. To-day the socialist sector in Slovakia cultivates more than 70% of all arable land; whereas in 1937 one tractor was only to little more than 2,300 hectars of land so it could be said that Slovak farmers worked practically completely without machines; in 1958 there was one tractor to 19.2 hectars of land. Agriculture received great numbers of complicated and efficient machines for the mechanisation of agricultural work and animal production. In co-operation with the countries of the socialist camp the mechanization of work is studied for which for the time being sufficient suitable machines are not available as for example for the collecting of root crops and certain seasonal work in spring.

The increase of qualified technical equipment and new production relations are expressed in the growth of the rough agricultural production which in comparison with 1956 rose in 1958 by 33%. Animal production at the same time was doubled and vegetative production increased by 19%. For example the number of pigs increased during the same period by more than three times and livestock almost by a fourth.

In the years of the Second and Third Five Years Plans extensive transformation as well as improvement of land will be undertaken. Supplies of fertilizers will increase and especially important are water-conservancy conditions. Melioration work during the Third Five Year Plan will be extended over 137,000 hectars, especially in East and South-west Slovakia. The project of transformation of the East-Slovakian lowlands, with the realization of which an area of almost 100.000 hectars of land had been started, must be mentioned.

Socialist industrialization brought about important changes in the social structure of

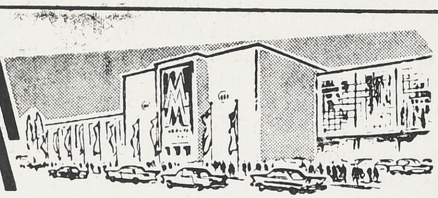
the population. The number of employees in industry in Slovakio increased in 1958 to 350,000 persons, the number of workers in agriculture fell below 40% of the total number of workers.

Important changes in the economic basis and social and class structure of the population became a precondition of the growth of the material and cultural standard of the working people. Whereas in 1937 one doctor was for 1800 inhabitants in Slovakia, the number of inhabitants per one doctor was in 1957 only 756. Slovakia has the same dense network of doctors of the most advanced capitalist countries had in the years 1953 and 1954, including the USA, Sweden, Belgium, Denmark, etc. The capacity of medical installations increased three times as compared with the period before the Second World War and in the country a swift building of hospitals as for example in Prievidza, Gelnica, Revuca, Ziar, etc. continues.

In 1937 a single university existed in Slovakia, viz. the Comenius University in Bratislava with 2,500 students, to-day there are twelve universities of all branches of study with more than 16,000 regular students and in addition there are those who study by other forms of study. At industrial, agricultural and building schools more than 40,000 students attend school. Cinemas exist in almost all places and wireless receivers are owned by practically every family. Television develops fast, the Bratislava television station is operating in addition and a further four are under construction. In the Third Five Year Plan as regards school classes more will be built than during the 20 years of the first Czechoslovak Republic.

The growth of employment and productivity of work which in the past ten years increased two and a half times became the precondition for an increase in the income of the population and the rise in their material standard. Individual consumption of the working people in Slovakia reached and in many things surpassed the consumption in certain highly developed capitalist countries.

The development planned in the Third Five Year Plan for the years 1961—1965 will still further accentuate these basic changes. The main importance in the development of industry will be placed especially on metallurgy, the chemical and engineering industry. In East Slovakia will be founded a new extensive metallurgical basis of the Republic—the East-Slovakian Iron works. ★



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RARE EARTH METALS

Scientists are finding new uses for so-called "rare earth metals" in communications and industry.

For example, the Commerce Dept. U.S.A., noted that these metals are helping to trap newtrons in nuclear reactors, light cigarettes, protect glass-blowers' eyes, send long-distance radio messages, and relieve sea-sickness.

Basic research on" rare earth metals" is taking place at the Department's National Bureau of Standards, where Dr. William F. Meggers predicts unlimied potential uses of the metals.

Fifteen "rare earth metals" receiving particular attention are the elements numbered 57 through 71, starting with lanthanum and ending with lutecium.

The metals were originally named rare earths because of their appearance and their scarcity. Today, however, they are available in quantity and at declining prices.

The newest—discovered in 1945—and the only one not found in nature, is prometheum named for the Greek god of fire. It is a fission product of uranium—235.

The 15 elements have many uses in the glass and metal industries, serving as purifiers of steel and copper and helping improve alloys of these metals, as well as of aluminum and magnesium.

The "rare earth metals" go into aerial photographic lenses, carbon lamps for high speed cameras and movie projectors, and radar and television amplifiers.

Cerium, the active ingredient in cigarette lighter flints, is also used for seasick remedies.

In coloring glass, neodymium creates a changing tone between red and lilac, and praseodymium, a tone between green and yellow.

The National Bureau of Standards sudies the "rare earth metals" by several methods. One process is called spectroscopy, analysis by wave-lenghts spread out with a prism. Another is purification with ion-exchange resins, a method analogous to distillation. A third method is x-ray analysis.

MAJOR INDUSTRIES

Alloy and Tool Steel Plant in Public Sector

The Government of India have selected an Indian private Limited firm of consulting engineers for the preparation of the detailed project report as well as the subsequent detailed designing of the proposed alloy and tool steel plant to be set up in the public sector. The proposed alloy and steel plant would have an initial annual capacity of 40.000 tons of ingots, expandable to 80,000 tons.

Steel in Public Sector

Out of the target to be fixed for steel production in the Third Plan, it is proposed to set apart about two and a half lakh tons of steel for manufacture by small units. Two furnaces for making iron in the public sector has already gone into production in the States of Orissa and Madras. Another to convert iron into steel being put up in Bombay. Government are considering proposals for setting up two other furnaces and three converters.

Manufacture of Motor Vehicles

The number of motor vehicles produced in the country will be about 35,500 this year as against 26,788 in 1958. During the current year, sufficient foreign exchange has been released to automobile manufacturers for the import of components.

Locomotive Component Parts Factory

The locomotive component parts factory at Manduadih near Banaras is expected to start production in 1961. Expenditure likely to be incurred on this factory is Rs. 4·79 crores for the scheme as a whole and Rs. 2·56 crores for the first phase to be completed by the end of the second Five Year Plan.

Atomic Fuel Fabrication Plant

The building of the atomic fuel fabrication plant has been completed, apart from a few minor finishing items.

All the equipment for the plant has been commissioned and tested for performance under continuous production - scale operations. Sample fuel elements for the Canada - India Reactor, produced in the plant, was sent to the Atomic Energy of Canada Ltd., early in October for irradiation tests

Second Atomic Reactor

The second Atomic Reactor is expected to start functioning by the end of March 1960. The main hall and control room will be ready by December 31, 1959, when the erection of the Reactor would start. The Reactor is expected to start functioning some three months thereafter. An expenditure of about Rs. 12·6 lakhs has been incurred on the Project up to the end of last month.

In an expanding economy, exports assume greater prominence. Shri Kapur, a renowned industrialist himself, makes a powerful plea for opening up new horizons.

EXPORT PROMOTION

JAI DEV KAPUR

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In the history of the industrial development of India, the present marks a critical stage. While there is reason to feel proud of our achievements in this field within the short time of a decade, there is a pressing necessity for consolidating our achievements and to prepare ourselves for further hard work in marching onwards The schemes and plans were formulated at the beginning with the modest aim of attaining self-sufficiency in the commodities required for the country's consumption, and many of our industries have attained the targets fixed for them. But the present aims are much different and call for a more arduous task. The slogan now is "Produce and Export". In fact, Export Promotion has gained such huge importance that there is exhortation from all sides to increase our exports. The significance of export is too well known to be discussed here at any length. It is an accepted fact that in the pattern of trade of any country, export occupies an important place and industry, trade and the Government of the country make all-out efforts to build up, maintain and expand their export lines. No industry can rest content with its achievements in the home market. Foreign markets must be captured and the export line must be built if the country is to attain economic prosperity. But in the present juncture of India's progress, Export has become more of a pressing necessity. This is due to the very plans and schemes which have been launched to take the country on to prosperity. Three main things required for industry are the multitudes of machines to be installed in factories, proper raw materials and technical personnel. That India is deficient in these three essential requisites is well known. Added to this, are the gigantic schemes included in the Public Sector, which require heavy machinery and equipment. Needless to say, we have to look to the supply of two essentials from the foreign countries, which in turn require considerable amount of foreign exchange. On top of these, import of foodstuffs cost heavily and our foreign exchange reserves had to be depleted. This state of affairs caused a crisis. The Second Five Year Plan had to be pruned to the very core, and all imports had to be virtually banned. To retrieve our foreign exchange position and to earn a credit, the only way left is to export as many things as possible.

Even before the independence, India has been exporting certain raw materials just as Jute, Tea etc. But after the War even these had to face serious foreign competition and their exports have taken a downward trend. Hence India has to think of exporting finished products rather than raw materials, and it is towards this end that all efforts are being made.

Export trade is governed by two main factors, namely, quality and price. In the recent past, our exports have suffered a serious set back on account of the lack of proper quality of the goods exported and also on account of unscrupulousness on the part of a section of the exporters. Quality implies uniformity in the quality. For example, in the case of products like ores, coal and minerals in general, orders are placed on the basis of samples submitted, which may be say a few lbs. only. No doubt in the case of such a sampling, the shipper will be careful enough to send the best. It should be borne in mind, however, that the samples submitted should represent the average quality of the consignment exported. There has been a lot of complaints that uniformity of quality has been lacking in some of the items exported. Besides these, even charges of adulteration in the goods, have been levelled against some of the exporters. This has made

the foreign importer to look at Indian made goods with a suspicious eye. Even leaving aside the black sheep in the export trade which resort to malpractices the general quality of our goods sought to be exported, should improve considerably before the commodities can stand competition in the foreign market. Quality control and standardisation are so essential that without them, export is very nearly impossible. In the recent days, these two essentials have gained considerable importance and leading factories have come to recognise their great need. If quality control is strictly clamped over production in factories, there is no doubt that the quality of the products will improve, besides helping economy of production.

The second factor, namely the price factor is equally important. The importer abroad will judge the offers received not only on the basis of quality but he will closely examine the prices of the commodities offered. India, being an infant in the export trade has to go through great teething trouble in this respect. The prices of most of the commodities intended to be exported are higher than those of the counter parts quoted by the competitors. The reasons for this position are many but some of them are very genuine and indisputable.

The foreign exchange crisis has brought about the ban on the import of even the essential raw materials. The quantity available in India being small, as compared to the requirements, the prices have shot up. In addition to this, the cost of labour has risen steeply. Strengthened by the various laws enacted by the Government in its favour and backed by interested political parties, the Indian labour has become very unreasonable and has come to look upon the private industry as a milch-cow (which it is not) The demands made by them do not fit in with the actual capacity of the industry to pay. The various taxes and levies made by the Government are additional factors which have gone to raise the cost of production to a very high level. This has placed industry in a very disadvantageous position as regards exports

Many suggestions have been made for overcoming the difficulties experienced by industry in promoting exports. As regards quality, a strict quality control should be exercised, and only merchandise of the right quality should be offered for export. The Hon'ble Minister for Commerce & Industry in his recent address to the Central Advisory Council of Industries, made a vehement appeal to the industrialists to give export a top priority and make all-out efforts to promote it. He even hinted that with a view to step up exports it might be necessary to introduce an element of compulsion. He did not, of course mean that goods should be exported at any cost, whether the customer abroad wants them or not. What he meant was, that by imposing compulsory exports, the manufacturers will be indirectly made to observe quality control. All these only show the great significance attached to the quality of the goods exported.

It is one thing to produce quality goods, but it is another to convince the buyer abroad about it Unless the confidence and the good will of the customer are won, no export trade can flourish. It has been suggesced that export consignments should be examined prior to their being shipped. The checking will include a test of the quality with the approved sample, weights and packing. Thus the testing will enable quality and the quantity to be properly checked. It goes without saying that such a check can only be exercised by an agency or organisation in which both the importer and the exporter have confidence A certificate issued by such an agency, would dispel any fear, as to the quality and quantity of the goods, that might have been entertained by the buyer.

Suggestions were also made by the Hon'ble Minister of Commerce & Industry in respect of the price factor vis-a-vis the exports. Here again he revived his idea of introducing compulsory exports. He opined that if certain industries are selected and if it is insisted that they should export a certain percentage of their production, then they will automatically find ways and means to adjust the prices to suit exports. The compulsion to export will induce each industry to organise itself and think collectively as to how to reduce prices to the level which will facilitate exports. He mentioned that by mutual agreement the manufacturers could agree to meet the loss on exports by a voluntary levy on the portion of the production intended for the home market.

As regards the mounting cost of labour, the Minister said that the existing rules and acts would not be reversed and suggested that the industry should take the things as it is and find other ways and means to reduce the cost of production.

How far the various suggestions are practicable, it is very difficult to judge. If any thing, they show how anxious and keen everyone is to promote exports. But coming from high sources, the suggestions deserve the close attention and deep consideration by the industrialists, who are more than any one else keen to export their products. ★

DIESEL

"DIESEL Trains" and "Diesel Cars" are now part of the vocabulary of people even in the remote villages of India. How many of these villagers know that these means of transport owe their origin to a German inventor, Rudolf Diesel?

Son of a book-binder in Augsburg, Bavaria, Rudolf Diesel came under the care of his uncle, a Mathematics Instructor, when he was a child of 12. The uncle sent him to a Technological School at Mannheim where his outstanding acheivements won him scholarships till be passed out of the institution in 1880.

Student's Resolve

Rudolf had been keenly interested in mechanical devices and as a student of 20 he resolved to construct an engine which could run with the minimum waste of energy.

For long years he carried out experiments with hopes and disappointments till he realised that his object could be achieved only in association with a progressive industrial establishment.

Then the decisive event took place which set things moving: he succeeded in interesting two of the most important German industrial firms, the Maschinenfabrik Augsburg and Friedrich Krupp in Essen, in the realization of his idea. Generously supported by these two firms he erected an experimental workshop and after nearly 5 years work, which was jeopardized by many failures and disappointments, fortune favoured him: the first engine in the world driven by crude oil ran in the presence of investigators and experts and showed a thermic effective power of 35 per cent, which so far had hardly been considered possible.

The "Diesel engine" was able to utilize the heat contents of its fuel many times better than other driving units. The French Navy equipped its first submarines with the new Diesel engine, and the inventor received a flood of orders and offers of contracts from abroad. The new century dawned, and with it the age of world-wide introduction of the internal combustion engine for the driving of dynamos ships, locomotives, and motor-cars.

Evil Days

When Rudolf Diesel was outwardly at the height of his fame, shadows began to fall upon his life. Diesel became involved in a nerve-racking vortex of patent disputes and business manipulations which at times threatened to assume catastrophic proportions. He had been completely overworked for a long time and should really have taken the holiday he needed so badly. Very few people suspected that his own financial ruin was very close at hand. Swindlers had cheated him of the major part of his fortune; he had ruined himself in speculations and by struggles with envious and hate-filled enemies which went on for years, and also consumed his mental powers.

He had just come back from a successful journey to America with the Members of the Council of the German Museum in Munich and later was to take part in the opening ceremony of a new factory for Diesel engines in Ipswich (England) in October 1913. But he never reached his destination.

While sailing from Antwerp to England he disappeared mysteriously from the steamer on which he was travelling. A few days later a dead body was seen floating in the English Channel and it was identified as that of Rudolf Diesel.

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